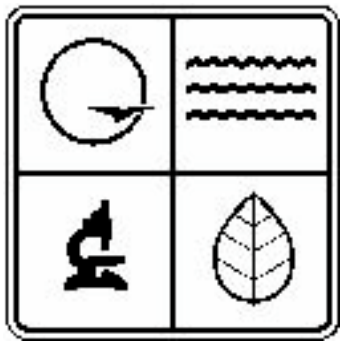

Missouri Department of Natural Resources
Water Pollution Control Program

Integrated Pest Management Methods of Mosquito Control for Wastewater Treatment Facility Operators

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Integrated Pest Management Methods of Mosquito Control for Wastewater Treatment Facility Operators

West Nile virus is spread by mosquitoes when they feed on the blood of infected birds. Infected mosquitoes then pass the disease to other birds, people or animals. Eliminating standing water or killing mosquito larvae is the most effective way to prevent problems with adult breeding mosquitoes. The U.S. Centers for Disease Control and Prevention and the American Mosquito Control Association recommend Integrated Pest Management Practices to reduce the risks of mosquito-borne diseases.

For All Systems

- General Housekeeping—Dispose of any litter that could hold water for a day or more. Trash receptacles should be water-tight and “varmint-proof”. Store equipment and supplies inside. Vegetation should not be allowed to grow over six inches.
- Hidden Water—Stumps, pipes, gutters, and equipment exposed to the environment should be filled, capped, plugged, or covered. Sumps and drain traps are common breeding sites. They should be covered or treated with appropriate pesticides. Notch tree stumps so they drain completely. Machinery that can hold water should be stored out of the elements. Check protective equipment coverings for pools of standing water. Grade and drain depressions around buildings. However, draining areas that support aquatic vegetation (like cattails) may require a permit from the U.S. Army Corps of Engineers. Contact your Army Corps of Engineers district office or the Missouri Department of Natural Resources for more information.
- Natural Alliances—Several types of birds, bats, dragonflies, frogs and toads can help keep the mosquito population in check. Encourage these natural allies to stay in the neighborhood by installing appropriate birdhouses, bat boxes and security lights. Contact the Missouri Department of Conservation for guidance in establishing and maintaining a healthy wildlife community.
- Monitor and Document—Perform and record weekly dipping for mosquito larvae. This simple process can save time and money by indicating if or when treatment is necessary. The Missouri Department of Natural Resources Environmental Assistance Center or the Missouri Department of Health and Senior Services can provide information for mosquito larvae monitoring.
- Proper Maintenance—Check, repair, or replace broken machinery. Give particular care and attention to equipment that is designed to keep water moving. Facilities operating at peak efficiency will help control mosquito development.
- Permit Compliance—Review operating permits for terms and conditions before applying pesticides or other chemicals to the treatment system. Many Missouri Operating Permits require notifying the Department of Natural Resources up to 30 days in advance of application. Contact the Missouri Department of Natural Resources for more information.
- Pesticide Use—Only two types of pesticides are authorized for use in controlling mosquitoes at Wastewater Treatment Facilities. Contact the Missouri Department of Agriculture for the brands that are specifically approved for use in sewage plants and systems.

Lagoon System

- Maintain Aeration—Lagoons are living biological systems that need adequate oxygen to function properly. Some lagoons use equipment to churn the water while others depend on the wind to mix in the required oxygen. Mechanical aeration equipment should be kept in good working order. Excessive amounts of duckweed, (more than 25 percent of the lagoon's surface) can slow water movement to the point where mosquitoes can breed successfully. Contact the Missouri Department of Natural Resources or Agriculture to determine the best method of control. Trees near poorly situated lagoons may need to be thinned to allow wind to reach the water's surface and facilitate mixing. It may be possible to stock some lagoons with fish that prey on mosquitoes. Contact the Missouri Department of Conservation for appropriate species.

Oxidation Ditch

- A properly designed and well-functioning oxidation ditch should be capable of preventing the establishment of a mosquito population. However, "dead zones," or quiet waters, have been noticed in some mechanical plants that use surface aerators. Generally, diffusers or submerged aerators provide better agitation. Foam or sludge that collects in corners or bends should be removed, and the basin tested for mosquitoes before applying a chemical treatment. Proper maintenance of these types of facilities is crucial to their success. Repair or replace damaged or malfunctioning parts as soon as possible. Inspections should take place on a frequent basis.

Package Plant

- Allowing a package plant to remain idle for too long can provide a breeding ground for mosquitoes. Setting timers for agitation at least twice a day for at least two hours should inhibit mosquito growth. Peak flow basins should be capable of being completely drained when not in use. Proper maintenance of these types of facilities is crucial to their success. Repair or replace damaged or malfunctioning parts as soon as possible. Inspections should take place on a frequent basis.

Primary & Secondary Clarifier

- A properly designed and well-functioning treatment cell should be capable of preventing the establishment of a mosquito population. However, "dead zones," or quiet waters, have been noticed in some clarifiers. Foam or sludge that collects in corners or bends should be removed, and clarifier tested for mosquitoes before applying a chemical treatment. Proper maintenance of these types of facilities is crucial to their success. Repair or replace damaged or malfunctioning parts as soon as possible. Inspections should take place on a frequent basis.

Treatment Wetland

- Wetlands must maintain adequate flow. Water that stands still for too long can result in undesirable odor, poor effluent quality, and provides a breeding ground for mosquitoes. Healthy, well-maintained wetlands will host a variety of beneficial insects that will help control mosquito larvae and adults. Regular monitoring for

mosquito larvae is essential to determine if and when treatment is necessary. It may be possible to stock some wetlands with fish that prey on mosquitoes. Contact the Missouri Department of Conservation for appropriate species.

Trickling Filter

- Pools of standing water in filter media may indicate problems with a treatment facility. If the cause cannot be corrected within a reasonable time period, monitor the water for mosquito larvae and treat with pesticides only when necessary. Notify the Department of Natural Resources regional office before applying any pesticides. Proper maintenance of these types of facilities is crucial to their success. Repair or replace damaged or malfunctioning parts as soon as possible. Inspections should take place on a frequent basis.

Land Application

- Standing water in an application field indicates that the field's absorption may be exceeding its capacity. A site evaluation to recalculate the agronomic rate of application may be necessary. Monitor the water for mosquito larvae and treat with pesticides only when necessary. Notify the Department of Natural Resources regional office before applying any pesticides. Contact the Natural Resources Conservation Service for a soil evaluation in the application field. If a facility is designed and permitted for overland flow, it may be necessary to grade areas to remove pooling. Proper maintenance of these types of facilities is crucial to their success. Repair or replace damaged or malfunctioning parts as soon as possible. Inspections should take place on a frequent basis.

Prevention is the simplest and most effective way to combat the spread of the West Nile virus. The following web addresses and contact numbers are useful resources and provide additional information about controlling the threat from mosquitoes.

Department of Natural Resources—**1-800-361-4827**

Department of Health and Senior Services—**573-751-6136**

http://www.health.state.mo.us/WestNileVirus/

U.S. Environmental Protection Agency (EPA) Mosquito Control Information

http://www.epa.gov/pesticides/factsheets/skeeters.htm